

Pulping of *P. Sylvestris* Roxb (Wild Date Palm) Branches

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ABSTRACT

This paper deals with the pulping and bleaching studies of branches of Phoenix Sylvestris Roxb (Wild Date Palm), a tree with large crown found throughout India. As the pulping Characteristics of Date palm branches are akin to some of the Hardwoods, this can be explored as an alternate source of fibrous raw material for pulp and paper industry.

Introduction :

Paper mills in India are currently facing acute shortage of conventional fibrous raw materials. The situation is likely to worsen in near future with increased paper demand due to the higher population growth, the increase in literacy, the growing trends of higher ratios of professional and technical jobs in the work force and the greater economic activity. The planning commission has indicated that by the end of 2000 A D. the indigenous production of paper and boards will have to be increased to 4.25 million tonnes (at a per capita consumption of 5 Kg) as against the present production of 1.8 million tonnes, at a per capita of 3.3 Kg.

To meet such a growing demand for more paper and dwindling supply of conventional raw materials for paper making, efforts are being made by the industry and the research organisations to explore the possibility of utilising newer and lesser known plants and shrubs etc.

SYLVESTRIS ROXB, is one among them. Locally it is called as wild Date Palm, Date Sugar Palm or Pedda Ita. The date palm belongs to PHOENIX genera.

There are numerous varieties of Dates grown in various Dates growing countries of the world. On the basis of their texture at maturity, the Date varieties are generally classified into three groups :

- 1) Soft
- 2) Semidry and
- 3) Dry

PHOENIX, SYLVESTRIS ROXB, a graceful palm of different heights (4-10 metres) with a large crown found through out India upto to an altitude of 1500 metres. Trunk covered with persistent bases of petioles. Leaves are 3.0-4.5 metres long greyish green, with a few short spines at the base. Pinnae numerous linear. 15-45 Cm long ending in short points. It can be grown in moist alluvial soils not too heavy and clayey. (1)

Experimental :

The branches of 7-8 years old date palm of long variety (without leaves) of 1.5-2.5 metres length and about 1-2 Cm girth resembling that of cane were manually cut into small size of 5 Cm in length. The proximate analysis was carried out as per Tappi standard testing methods. The fibre dimensions were determined using microscope.

The results are presented in Table—1

Pulping :

Kraft pulping was done with two dosages of active alkali (15.5 & 16.0%). The cooking conditions and results are presented in Table—2.

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Bleaching :

Among the two pulps, the lower K. No. (17.3) pulp was bleached with CEH sequence. The bleaching conditions, results and the bleached pulp properties are given in Table—3.

Results & Discussion :

1. The chips bulk density (0.21T/Cu. M) is comparable to that of mixed hardwoods.
2. The Alcohol-Benzene extractives (8.8%) are on higher side compared to Casurina and Eucalyptus (2—5%) which are mostly used hardwoods now-a-days. However, it is comparable with that of some of the hardwoods like Yegisa (Pterocarpus Marsupium) and Bandaru (Adina-Cardifolia).

The higher Alcohol- Benzene extractives are likely to cause foaming problems during washing etc. This can be overcome by using suitable defoaming agents in washing system.

3. The Lignin content (27.7%) is comparable to that of mixed hardwoods (26—28%) but it is slightly higher than Casurina and Eucalyptus (23—27%).
4. The pulp yield (40%) is less compared to Casurina and some of the mixed hardwoods (43—50%) This may be due to the higher alkali solubility (32.3%) and lignin content.
5. The unbleached pulp strength properties are comparable to hardwoods, Eucalyptus and Casurina. The lower tear factor may be due to the shorter fiber length (1.1mm).

Table—1

**Proximate Analysis and Fibre Dimensions of
P. Sylvestris Roxb, Branches**

S. No.	Particulars	Wild Date Palm	Casurina/Eucalyptus
1.	Proximate Analysis		
	a. Ash..... %	2.47	0.7-1.0
	b. Acid Insolubles..... %	1.03	0.40
	c. Alcohol-Benzene Extractives..... %	8.80	2.0-5.0
	d. 1% NaOH Solubility..... %	32.30	18-20
	e. Holo Cellulose (ash corrected)..... %	63.40	70-72
	f. Lignin (ash corrected)..... %	27.70	23-27
	g. Pentosans..... %	20.70	14-17
	(All the results are on O.D. basis)		
2.	Fibre Dimensions		
	a. Average Fibre Length.....mm.	1.10	0.8-1.0
	b. Average Fibre Width.....,.....Microns	10.40	11-15
	c. Slenderness Ratio (l/d).....	105.80	65-75

Table—2
Cooking Conditions and Pulping Results of
P. Sylvestris ROXB, Branches

S. No.	Particulars	Cook-1	Cook-2	Casurina/ Eucalyptus
1.	Bulk Density (on OD chips basis).....T/Cu.M	0.21	—	0.22
2.	Chemical added as Na ₂ O.....%	15.50	16.0	14-15
3.	Sulphidity.....%	18.50	18.5	18-20
4.	Cooking Temperature.....°C	165	168	168
5.	Steaming Time.....mts.	150	45 mts 75 mts	to to 130°C 168°C
6.	Cooking Time.....mts.	60	30+90	30+90
7.	R.A.A. in spent liquor.....gpl.	10.85	9.50	8.53-9.78
8.	Screened Yield.....%	38.10	40.00	45-50
9.	Total Rejects.....%	6.70	0.50	0.4-2.6
10.	Total Yield.....%	44.80	40.50	48-51
11.	Effective Yield.....%	40.70	40.20	46-49
12.	Permanganate Number.....	23.0	17.3	16-18
13.	Strength Properties at 40 SR			
a.	Burst Factor.....	49	50	37-45
b.	Breaking Length.....metres...	7935	8400	6400-8000
c.	Tear Factor.....	62	68	55-65
d.	Double Folds.....Nos.	85	116	65-115

Table—3
Bleaching Conditions and Results of P. Sylvestris ROXB.
(Wild Date Palm)

S. No.	Particulars	Wild Date Palm	Casurina/Eucalyptus
1	K. NO.	17.3	16-18
2	Chlorination		
	a. Chlorine added..... %	5.9	3.8-6.2
	b. Initial/Final pH.....	1.8/1.6	1.8-2.1/1.6-1.8
	c. Consistency..... %	3.0	3 0
	d. Retention time.....Hrs.	1.0	1.0
	e. Chlorine consumption..... %	88.3	85-92
3	Alkali Extraction		
	a. Alkali added as NaOH..... %	2.5	2.5
	b. Initial/Final pH.....	11.2/10.9	11.5-11.7/ 11.2-11.4
	c. Consistency..... %	10.0	10.0
	d. Retention time.....Hrs.	1.5	1.5
	e. Alkali consumption..... %	42.4	45-50
4	Hypo Stage		
	a. Hypo added..... %	1.9	1.6-2.6
	b. Buffer added to maintain pH above 8.5..... %	0.69	0.5-0.7
	c. Consistency..... %	10.0	10 0
	d. Hypo consumption..... %	99.7	87-88
	e. Bleached pulp brightness..... %	79.0	78.5-82.0
	f. Viscosity... ..Cps	7.0	6.5-9.5
5	Bleached Pulp Strength Properties at 40 SR		
	a. Burst Factor.....	34	34-36
	b. Breaking Length.....metres	6210	6400-6600
	c. Tear Factor.....	42	45-60
	d. Double Folds.....Nos	6	6-8

Conclusions :

Though the yield is slightly low, as the chemical requirement, bleachability and strength properties of P. Sylvestris Roxb branches are comparable to the conventional mixed hard woods. This can be exploited as a promising source of raw material to supplement the shortage of the fibrous raw material. But, the overall economics depends upon the individual mills requirements and proximity to the availability of the material.

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